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"What's wrong with my trees?"

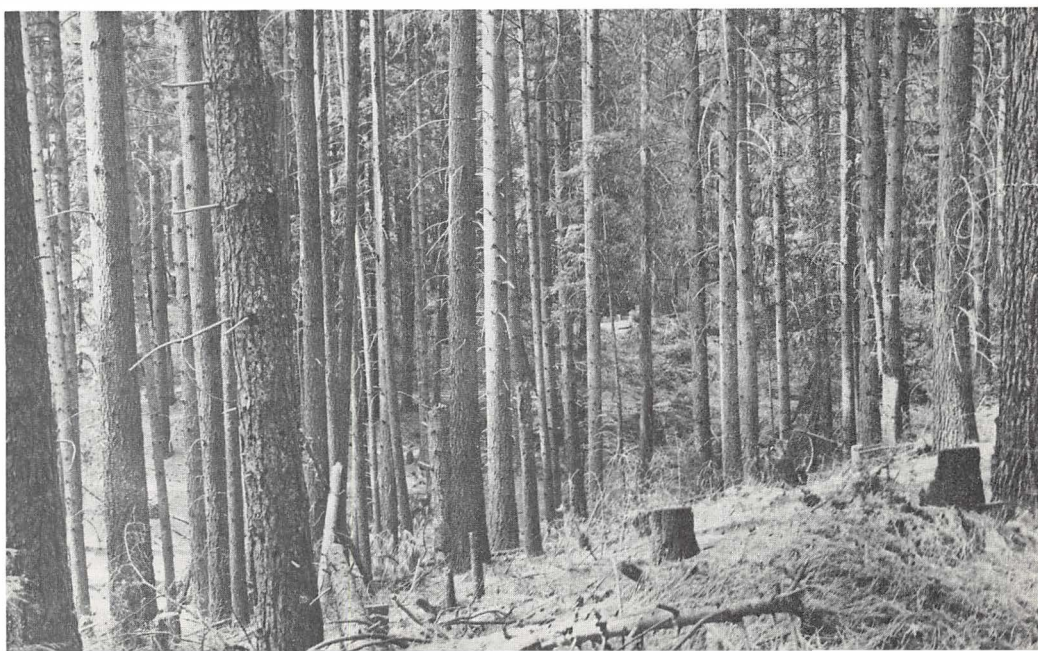
DOUGLAS-FIR DAMAGED BY ENGRAVER BEETLES

In late 1958, northwestern California foresters began to notice dying trees in stands of young Douglas-firs—trees that to all outward appearances had been growing vigorously and seemed destined for a long healthy life. Foresters and entomologists who checked up found these trees heavily infested with tiny beetles known as Douglas-fir engravers. These beetles have damaged trees up to 2 feet in diameter, in scattered groups over a gross area of some 1,000 square miles in Humboldt and Mendocino counties. Many landowners and foresters have asked if this damage is likely to continue, thus handicapping sustained production of Douglas-fir. To answer, let's take a look at the habits of the insect.

THE INSECT

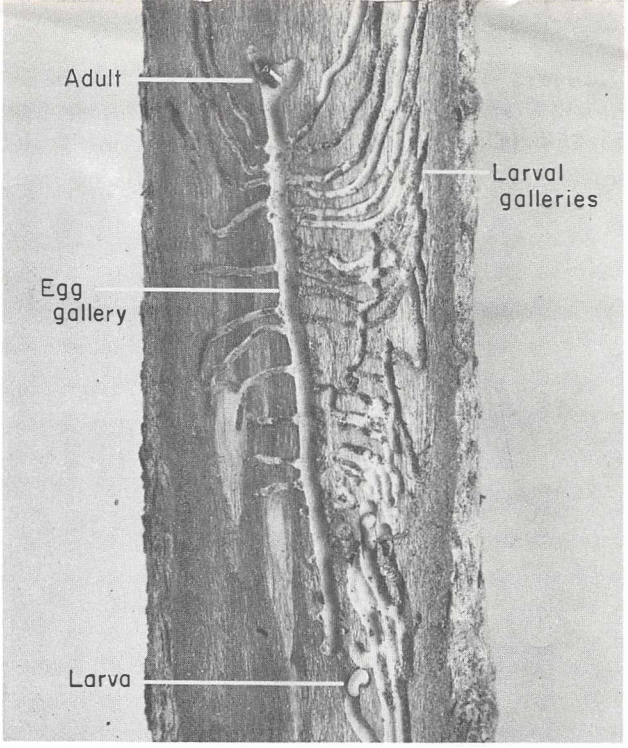
The Douglas-fir engraver, known to the scientist as Scolytus unispinosus Lec., is a member of the beetle family Scolytidae. It is a close relative to the western pine beetle and the mountain pine beetle, two of our most destructive tree-killing insects.

The Douglas-fir engraver, however is not usually a tree-killer. Under normal conditions it attacks only weakened or dying trees, such as those that are affected by root diseases or mechanical injury. It sometimes attacks recently killed trees and logging slash. Douglas-fir engravers are always present in the forest, but usually in such small numbers that they are seldom noticed.



Dense second-growth Douglas-fir stand typical of those being attacked by insects.

Egg and larval galleries on a Douglas-fir limb.



Attacks are started by the adult beetles. Pairs of adults bore through the bark directly into the cambium region. Here they excavage an egg gallery—a tunnel 1 1/4 to 3 inches long, parallel to the grain of the wood except at its start. They lay eggs along the sides of this gallery, and when the eggs hatch, the tiny larvae begin mining out laterally. If there are many galleries, the tree or limb is girdled and dies. When the larvae have completed their development, they rest and change into pupae, at the ends of the tunnels. After pupation, having transformed into new adults, the beetles bore their way out and begin the cycle once again. There are two generations each year.

CAUSES OF OUTBREAK

A natural system of checks and balances usually keeps these insects under control. Birds and other insects feed on them, and some of the trees they attack throw them off. All in all, a relatively static, small population is maintained.

But biological systems are continually changing. From time to time the influences of certain natural control factors get out of balance, and the system breaks down. This is probably the cause of this insect outbreak—a sudden, and probably only temporary, change in environmental conditions.

In northwestern California, the months of August, September, and October 1958 were record-breaking or nearly so for both high temperature and lack of rainfall. These conditions may well have changed the insect environment so as to allow them to build up to epidemic numbers.

The extended warmth undoubtedly permitted insect development to continue on into the fall when normally it would have ceased. At the same time, trees became less resistant to attack because of the effects of the drought.

WHAT ABOUT THE FUTURE?

No outbreak of this insect has persisted for more than a year, as far as can be determined. While it is true that recent logging has wrought some changes in the ecology of the area, entomologists feel that these changes have not been drastic enough and universal enough to cause the insects to "change their spots," so to speak, and take on new ways permanently. It is expected that the infestation will cease to be epidemic when the trees recover from the effects of the drought.

WHAT CAN BE DONE NOW?

Beetles in currently infested trees can be killed by felling and burning the trees. This will help to reduce the insect population, but because the insects also live in slash and dying trees throughout the woods, felling and burning cannot be expected to eradicate them. Past outbreaks have been so short lived that control has never been attempted.

Because outbreaks of the Douglas-fir engraver are uncommon, opportunities to study them have been few. The current outbreak will enable us to build up additional knowledge that will aid in analyzing similar situations in the future.

--Prepared by R. E. Stevens,
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